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PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Hideaki YAGUCHI Attn: PCT Branch

New U.S. National Phase of PCT/JP2004/016450

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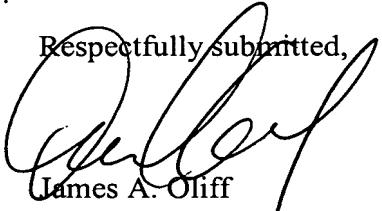
For: MOTOR DRIVE APPARATUS

**TRANSMITTAL OF TRANSLATION OF THE ANNEXES TO THE  
INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY**

Commissioner for Patents  
P.O. Box 1450  
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Sir:

Attached hereto is a translation of the annexes to the International Preliminary Report on Patentability (Form PCT/IPEA/409). The attached translated material replaces the material in the specification at page 2 and claim 1.

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The conventional power-supply system apparatus, however, has a problem that, in the case where the voltage step-up operation for stepping up a DC voltage from the battery and a drive operation for driving the asynchronous machine as a starter are carried out at the same timing, excessive electric power is taken from the battery to the asynchronous machine.

There is also a problem that, in the case where a voltage step-down operation for stepping down a DC voltage from the pulse inverter and a drive operation for driving the asynchronous machine as an electric generator are carried out at the same timing, excessive electric power is brought from the asynchronous machine into the battery.

Accordingly, an object of the present invention is to provide a motor drive apparatus that can prevent input/output of excessive electric power to/from a power supply.

#### Disclosure of the Invention

According to the present invention, a motor drive apparatus includes a first drive circuit driving a first motor and a voltage converter performing a voltage conversion between a power supply and the first drive circuit. Under the condition that electric power that is output from the power supply and that undergoes the voltage conversion by the voltage converter is provided to and from between the first drive circuit and the first motor for driving the first motor and the condition that the first motor is started to be driven, the first drive circuit starts to drive the first motor at a timing different from a timing at which the voltage converter starts the voltage conversion.

Preferably, the voltage converter performs a voltage step-up operation of stepping up a power supply voltage to an arbitrary level and outputs the stepped-up voltage, and the first drive circuit starts to drive the first motor in powering mode after the voltage converter starts the voltage step-up operation.

Preferably, the first drive circuit starts to drive the first motor in powering mode after the voltage step-up operation is completed.

CLAIMS

1. (Amended) A motor drive apparatus comprising:

a first drive circuit (14) driving a first motor (MG1); and

5 a voltage converter (12) performing a voltage conversion between a power supply (B) and said first drive circuit (14), wherein

under the condition that electric power that is output from said power supply (B)  
and that undergoes the voltage conversion by said voltage converter (12) is provided to  
and from between said first drive circuit (14) and said first motor (MG1) for driving said  
10 first motor (MG1) and the condition that said first motor (MG1) is started to be driven,  
said first drive circuit (14) starts to drive said first motor (MG1) at a timing different from a timing at which said voltage converter (12) starts the voltage conversion.

2. The motor drive apparatus according to claim 1, wherein

15 said voltage converter (12) performs a voltage step-up operation of stepping up a power supply voltage to an arbitrary level and outputs the stepped-up voltage, and  
said first drive circuit (14) starts to drive said first motor (MG1) in powering mode after said voltage converter (12) starts the voltage step-up operation.

20 3. The motor drive apparatus according to claim 2, wherein

said first drive circuit (14) starts to drive said first motor (MG1) in powering mode after said voltage step-up operation is completed.

4. The motor drive apparatus according to claim 3, wherein

25 said first drive circuit (14) receives, after said voltage step-up operation is completed, a required power of said first motor (MG1) and starts to drive said first motor (MG1) in powering mode.

**English Translation of Anexes to IPRP (substitute page)**

5. The motor drive apparatus according to claim 4, wherein  
said first drive circuit (14) holds in advance a relation between temperature of  
said power supply (B) and an electric power level that can be output from said power  
supply, and determines a timing at which said first motor (MG1) is started to be driven,

**English Translation of Anexes to IPRP (substitute page)**

Preferably, the first drive circuit receives, after the voltage step-up operation is completed, a required power of the first motor and starts to drive the first motor in powering mode.